

REMARKS

Applicants acknowledge the indication of the allowability of the subject matter of Claims 26-47, as set forth in item 3 on page 3 of the Office Action. In particular, the latter claims would be allowable if rewritten in independent form. By the foregoing amendment, that has been done, and accordingly, Claims 26-47 are now believed to be allowable.

Claims 23-25 and 48-50 have been rejected under 35 USC §102(b) as anticipated by Seko et al (U.S. Patent No. 4,594,583). However, for the reasons set forth hereinafter, Applicants respectfully submit that all claims which remain of record in this application distinguish over the cited reference, whether considered separately, or in combination with other references of record.

The present invention is directed to a method and apparatus for evaluating the inattentiveness of a driver of a vehicle, and furthermore for assessing the severity of the state of inattentiveness. For this purpose, in the method according to the invention, the movement of the steering wheel of the vehicle (in the form of a steering wheel angle x) is detected, and a “steering quiescent phase” is identified whenever the steering wheel angle x remains within a predetermined steering wheel angle interval. In particular, in the method according to the invention, the extent of the steering quiescent phase is determined by evaluating the steering angle x or the time variation thereof, and the extent of the steering quiescent phase is the duration in which the steering wheel angle x remains within the predetermined steering wheel angle interval.

Following such a quiescent phase, the method according to the invention identifies the steering action, and determines an extent thereof, by evaluating the rate of change of the steering wheel x. Thereafter, according to the invention, the extent of the steering quiescent phase and the extent of the steering action are logically linked using a multidimensional operator that comprises either a family of characteristics, a weighting function or a logical decision function. Finally, the result of such logical linking is evaluated as a measure of the severity of the inattentiveness of the driver, only when the extent of the steering quiescent phase in the form of its time period is greater than a predetermined minimum time period, and the maximum gradient of the steering wheel angle exceeds a predetermined threshold value.

All of the features described above, are now included in Claim 23 as amended.

The Seko et al patent, on the other hand, discloses a method and system for detecting driver drowsiness, based on an abrupt change in the steering angle following a period of “non-steering”. To this extent, it is similar to the present invention. Moreover, in Seko et al, the values that are compared to the magnitude and speed of the abrupt steering adjustments in order to recognize steering behavior which is indicative of drowsiness are adjusted in accordance with the duration of the non-steering period. (See Abstract of the Disclosure; Column 2, lines 7-11; and Column 3, line 30 – Column 4, line 4.)

The end result of the methodology disclosed in Seko et al, however, is simply the recognition of a state of drowsiness on the part of the driver. When such a state is detected, an alarm 7 (Figure 1) is activated. (Column 2, lines 59-62.) Thus, the Seko et al system detects “whether the vehicle driver’s driving behavior reflects drowsiness”. (Column 2, lines

59-60.) No provision is made for assessing the severity of the driver's inattentiveness. Accordingly, following a determination of a state of drowsiness, by comparing the magnitude and speed of abrupt steering adjustments to predetermined parameters that are set as a function of the length of a period of "non-steering", other than activating an alarm, no further action is taken or provided for.

Accordingly, Applicants respectfully submit that the Seko et al patent does not teach or suggest a system in which the extent of a steering quiescent phase and the extent of a subsequent steering action are logically linked "using a multidimensional operator that comprises one of i) a family of characteristics, ii) a weighting function, and iii) a logical decision function", and accordingly, it also contains no provision for assessing the result of such a logical linking as a measure of the severity of the driver's inattentiveness. Therefore, it also contains no provision that such an assessment based on such a logical linking is carried out "only when the extent of the steering quiescent phase is greater than a predetermined minimum time period and a maximum gradient of the steering wheel angle exceeds a predetermined gradient threshold value.

Accordingly, Applicants respectfully submit that Claim 23 as amended distinguishes over the Seko et al patent, and is allowable. In addition, new Claims 51-54 have been added. The latter claims are believed to be allowable by virtue of their dependence on Claim 23, for the reasons noted previously. However, in addition, new Claim 52 (which is based on Claim 33) recites that the multidimensional operator of Claim 23 is dimensioned on the basis of vehicle speed or a driver's driving style dynamics. Moreover, Claims 53 and 54 further recite details of the method, in which the result of the logical linking of Claim 23 is mapped into a

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probability value for the driver's inattentiveness, using a sigmoid function, with Claim 54 spelling out additional details of the probability operation as well. Applicants respectfully submit that the latter features of the invention are also not taught or suggested by the Seko et al patent.

In light of the foregoing amendments and remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If there are any questions regarding this response or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323, Docket No. 095309.57739US.

Respectfully submitted,


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